

PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Stratton et al.

Group No.: 1775

S/N: 10/521,526

Examiner: Michael E. LaVilla

Filed: November 7, 2005

Atty. Dkt.: M02B123

For: THERMAL TREATMENT METHOD

Commissioner for Patents
P.O. Box 1450
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Phyllis Servon

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CORRECTION OF FILING RECEIPT

Sir:

The title on the Filing Receipt is requested to be corrected as shown in red ink.

The correct title of this patent application serial number 10/521,526 should read:

THERMAL TREATMENT METHOD

Respectfully submitted,

Bernard Lau
Reg. No. 38,218
Attorney for Applicants
Tel: (908) 771-1320
Fax: (908) 771-6159

Date: October 25, 2006
The BOC Group, Inc.
Legal Services - IP Dept.
575 Mountain Ave.
Murray Hill, NJ 07974

FEB 03 2006



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APPL NO.	FILING OR 371 (c) DATE	ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLMS	IND CLMS
10/521,526	11/07/2005	1773	1030	M02B123	3	7	1

20411
THE BOC GROUP, INC.
575 MOUNTAIN AVENUE
MURRAY HILL, NJ 07974-2064



CONFIRMATION NO. 2103

FILING RECEIPT



OC000000017938115

Date Mailed: 01/31/2006

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Paul Francis Stratton, Bradley-Huddersfield, ENG, UNITED KINGDOM;
John B. Boodey, Wrightstown, PA;

Power of Attorney: The patent practitioners associated with Customer Number 20411.

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/GB03/03077 07/14/2003.

Foreign Applications

UNITED KINGDOM 0216527.2 07/16/2002

Projected Publication Date: 05/11/2006

Non-Publication Request: No

Early Publication Request: No

Title

[~~Method of case hardening titanium and zirconium alloys~~]

THERMAL TREATMENT METHOD

Preliminary Class

428

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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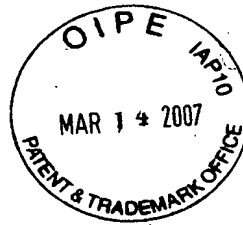
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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371		ATTORNEY'S DOCKET NUMBER M02B123
INTERNATIONAL APPLICATION NO. PCT/GB03/03077	INTERNATIONAL FILING DATE 14.07.2003	U.S. APPLICATION NO. (If known, see 37 CFR 1.5)
PRIORITY DATE CLAIMED 16.07.2002		
TITLE OF INVENTION THERMAL TREATMENT METHOD		
APPLICANT(S) FOR DO/EO/US Stratton et al.		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a submission under 35 U.S.C. 371.		
2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a submission under 35 U.S.C. 371.		
3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.		
4. <input checked="" type="checkbox"/> The US has been elected (Article 31).		
5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))		
a. <input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).		
b. <input checked="" type="checkbox"/> has been communicated by the International Bureau.		
c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).		
6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).		
a. <input type="checkbox"/> is attached hereto.		
b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).		
7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))		
a. <input checked="" type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).		
b. <input type="checkbox"/> have been communicated by the International Bureau.		
c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.		
d. <input type="checkbox"/> have not been made and will not be made.		
8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).		
9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).		
10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).		
Items 11 to 20 below concern document(s) or information included:		
11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.		
12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.		
13. <input checked="" type="checkbox"/> A preliminary amendment.		
14. <input checked="" type="checkbox"/> An Application Data Sheet under 37 CFR 1.76.		
15. <input type="checkbox"/> A substitute specification.		
16. <input type="checkbox"/> A power of attorney and/or change of address letter.		
17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 37 CFR 1.821- 1.825.		
18. <input checked="" type="checkbox"/> A second copy of the published International Application under 35 U.S.C. 154(d)(4).		
19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).		
20. <input type="checkbox"/> Other items or information:		

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U.S. APPLICATION NO. (if known, see 37 CFR 1.5)		INTERNATIONAL APPLICATION NO. PCT/GB03/01602		ATTORNEY'S DOCKET NUMBER M02B123		
21. The following fees are submitted:				Applicant use	Office use only	
<input type="checkbox"/> a) Basic national fee..... \$300.00				\$ 300.00		
<input type="checkbox"/> b) Examination fee..... \$200.00				\$ 200.00		
<input type="checkbox"/> c) Search fee..... \$500.00				\$ 500.00		
TOTAL OF ABOVE CALCULATIONS = \$1000.00				\$ 1000.00		
<input type="checkbox"/> Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing or computer program listing filed in an electronic medium). The fee is \$250 for each additional 50 sheets of paper or fraction thereof.						
Total Sheets	Extra sheets	Number of each additional 50 or fraction thereof (round up to a whole number)	RATE			
- 100 =	/50 =	0	x \$250.00	\$ 0 0		
Surcharge of \$130.00 for furnishing the oath or declaration later than 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$		
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$		
Total claims	7 - 20 =	0	x \$50.00	\$ 0		
Independent claims	- 3 =		x \$200.00	\$ 00		
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$360.00	\$ 0		
TOTAL OF ABOVE CALCULATIONS =				\$ 1000.00		
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$		
SUBTOTAL =				\$		
Processing fee of \$130.00 for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$		
TOTAL NATIONAL FEE =				\$		
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$		
TOTAL FEES ENCLOSED =				\$ 1000.00		
Amount to be refunded:					\$	
Amount to be charged					\$	
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				 SIGNATURE		
				Joshua L. Cohen NAME		
				34,307 REGISTRATION NUMBER		



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No. : TBA Inventor : Stratton et al.
Attorney Docket : M02B123 Group Art Unit : TBA
Filed : January 14, 2005 Examiner : TBA
Title : THERMAL TREATMENT METHOD

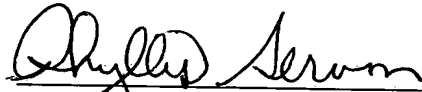
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PHYLLIS SERVON

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PRELIMINARY AMENDMENT

Sir:

In advance of examination on the merits in connection with the application identified above, please amend such application as follows.

AMENDMENTIn the Specification:

Replacement paragraph [0022] beginning at page 5 of the specification is marked up to show changes made relative to the immediate prior version and is presented below:

[0022] *Test Apparatus* - All of the thermal treatments were conducted in a high purity alumina tube furnace at a temperature of either 850°C or 900°C. During processing the atmosphere was maintained at a constant inlet composition and flow of 3000 cc/min using a MKS 647B Multi-Channel Gas Controller system. Two argon/oxygen mixtures were mixed to produce the correct atmosphere composition. The first mixture was "house" argon with less than 1 ppm oxygen. The second mixture was obtained from a certified premixed cylinder containing argon with 1040 ppm oxygen. The temperature was maintained with an external thermocouple and monitored with an internal thermocouple. Two samples were heat treated together and were held vertically in a specially manufactured holder to ensure uniform surface exposure. At the outlet side of the tube furnace, an Illinois Instruments oxygen analyser, Model 2550 was ~~sued~~ used to monitor the composition of the flowing gas.

In the Claims:

A complete listing of all claims pending in the present application including claims status thereof is provided with markings to show changes made relative to all prior versions of the claims in the application.

1. (currently amended): A method of case hardening an article of titanium or a titanium-based alloy, or an article of zirconium or a zirconium-based alloy, ~~wherein~~ comprising treating the article is with heat ~~treated~~ for a period of at least 12 hours at at least one ~~or more temperatures in~~ temperature selected from the range of 850°C to 900°C and at a pressure in the order of atmospheric pressure in an oxygen diffusion atmosphere, the atmosphere comprising:
 - a) a carrier gas which does not react chemically with the article in the ~~said~~ temperature range, and
 - b) molecular oxygen, wherein ~~the~~ a concentration of oxygen in the oxygen diffusion atmosphere is in the range of 10 volumes per million to 400 volumes per million.
2. (currently amended): A The method ~~as claimed in~~ according to claim 1, ~~in which~~ where-
in the oxygen concentration is in the range of 75 to 300 volumes per million.
3. (currently amended): A The method ~~as claimed in~~ according to claim 2 1, ~~in which~~
wherein the oxygen concentration is in the range of 100 to 200 volumes per million.

4. (currently amended): A ~~The~~ method according to ~~any one of the preceding claims claim 1,~~
~~in which the case hardened~~ further comprising subjecting the article is subjected to a
further heat treatment at a temperature in the range of 500°C to 900°C in an atmosphere
having an oxygen concentration of at least 5000 volumes per million so as to form a
visible surface oxide layer on the article ~~that improves its~~ to improve tribological
properties of the article.
5. (currently amended): A ~~The~~ method ~~as claimed in~~ according to claim 4, ~~in which~~
wherein the atmosphere in which the tribological surface oxide layer is formed contains
from 15% to 25% by volume of oxygen and from 75% to 85% by volume of argon.
6. (currently amended): A ~~The~~ method ~~as claimed in any one of the preceding claims~~
according to claim 1, ~~in which~~ wherein the said carrier gas is argon.
7. (currently amended) A case hardened article of titanium, ~~or~~ a titanium-based alloy, ~~or~~ of
zirconium or a zirconium-based alloy ~~obtainable~~ provided by a the method according to
~~any one of the preceding claims claim 1.~~

REMARKS

Paragraph [0022] of the specification is amended as to matters of spelling.

Claims 1-7 are pending in the present application. Claims 1-7 are requested to be amended as indicated in the marked-up copy of the claims to provide for better reading of the claims and to present same in the proper format for examination under United States practice.

The foregoing amendments to the claims are requested to be entered and examination on the merits requested to commence. It respectfully is submitted that claims 1-7 are in condition for allowance.

Respectfully submitted,

By: 

Joshua L. Cohen
Attorney of Record
Reg. No.: 34,307
TEL: (908) 771-6167
FAX: (908) 771-6159

January 14, 2005

The BOC Group, Inc.
Legal Services-IP Dept.
575 Mountain Avenue
Murray Hill, NJ 07974-2064

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Stratton et al.

Group No.: 1775

S/N: 10/521,526

Examiner: Michael E. LaVilla

Filed: November 7, 2005

Atty. Dkt.: M02B123

For: THERMAL TREATMENT METHOD

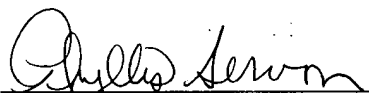
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Phyllis Servon

Printed name of person signing this certificate


Signature of person mailing

AMENDMENT

Sir:

In response to the Office action of July 26, 2006, please amend the above-identified application as follows.

Amendment to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 4 of this paper.

Amendment to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A method of case hardening an article of titanium or a titanium-based alloy, or an article of zirconium or a zirconium-based alloy, comprising treating the article with heat for a period of at least 12 hours at at least one temperature selected from the range of 850°C to 900°C and at a pressure ~~in~~on the order of atmospheric pressure in an oxygen diffusion atmosphere, the atmosphere comprising:
 - a) a carrier gas which does not react chemically with the article in the temperature range, and
 - b) molecular oxygen, wherein a concentration of oxygen in the oxygen diffusion atmosphere is in the range of 10 volumes per million to 400 volumes per million.
2. (previously presented) The method according to claim 1, wherein the oxygen concentration is in the range of 75 to 300 volumes per million.
3. (currently amended) The method according to claim 42, wherein the oxygen concentration is in the range of 100 to 200 volumes per million.
4. (currently amended) The method according to claim 42, further comprising subjecting the article to further heat treatment at a temperature in the range of 500°C to 900°C in an atmosphere having an oxygen concentration of at least 5000 volumes per million, with the balance being non-reactive carrier gas so as to form a visible surface oxide layer on the article to improve tribological properties of the article.

5. (previously presented) The method accordingly to claim 4, wherein the atmosphere in which the tribiological surface oxide layer is formed contains from 15% to 25% by volume of oxygen and from 75% to 85% by volume of argon.

6. (currently amended) The method accordingly to claim 14, wherein the carrier gas is argon.

7. (canceled)

REMARKS

Claims 1-6 are pending in this application.

The claims have been amended to more particularly pointing out and distinctly claim the subject matter which applicants regard as their invention. No new matter was added.

Applicants request consideration of the pending claims 1-6.

Election/Restriction

Claims 1-7 in this application have been restricted into two groups:

Group I, claims 1-6, drawn to a method of case hardening a Ti, Zr, Ti alloy, or Zr alloy article; and

Group II, claim 7, drawn to a case hardened Ti, Zr, Ti alloy, or Zr alloy article.

Applicants' representative provisionally elected, without traverse, to prosecute the invention of Group I, claims 1-6, on July 5, 2006. Applicants' representative hereby affirms the election to prosecute the invention of Group I, claims 1-6, and cancel Group II, claim 7, without prejudice, in this application.

Applicants reserve the right to file one or more continuation or divisional applications for the unelected claims at a later date.

Claim Rejections - 35 U.S.C. § 112

Claims 1-6 were rejected under 35 U.S.C. 112, second paragraph.

With regard to claim 1, the unclear phrase "at a pressure *in* the order of atmosphere pressure in an oxygen diffusion atmosphere" has been amended to read "at a pressure on the order of atmosphere pressure in an oxygen diffusion atmosphere."

With regard to claim 4, the phrase "with the balance being non-reactive carrier gas" was added for clarification.

Applicants thank the Examiner for his suggestion in amending this claim.

On the basis of these amendments, applicants submit that claims 1-6 are patentable. Accordingly, applicants respectfully request reconsideration and

withdrawal of the rejection to claims 1-6, as amended, based on 35 U.S.C. 112, second paragraph.

Allowable Subject Matter

Applicants gratefully acknowledge the Examiner's careful review of the present application, and his suggestion that claims 2-6 would be allowable if rewritten to overcome the claim rejections to 35 U.S.C. 112, second paragraph as discussed above, and to include all of the limitations of the base claim and any intervening claims. Accordingly, claims 3, 4 and 6 have been renumbered to include the limitations of the base and intervening claims.

Conclusion:

Applicants respectfully submit that the present application is in condition for allowance. Early notice to that end is earnestly solicited.

If a telephone conference would be of assistance in furthering prosecution of the subject application, applicants request that the undersigned be contacted at the number below.

Respectfully submitted,



Bernard Lau
Reg. No. 38,218
Attorney for Applicants
Tel: (908) 771-1320
Fax: (908) 771-6159

Date: October 25, 2006
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